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Commentary: Mycotoxin Regulations and BT Corn Benefits

Abstract

Felicia Wu, an economist from the University of Pittsburgh, gave an interesting presentation at the BIGMAP symposium held at Iowa State University recently. Wu discussed the reduced risk of mycotoxins, and how regulations on mycotoxins and transgenic crops affect international trade.

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Comments

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COMMENTARY: MYCOTOXIN REGULATIONS AND BT CORN BENEFITS

By Gary Munkvold

Felecia Wu, an economist from the University of Pittsburgh, gave an interesting presentation at the BIGMAP symposium held at Iowa State University recently. Wu discussed the reduced risk of mycotoxins in grain from Bt corn hybrids, the economic impacts of mycotoxins, and how regulations on mycotoxins and transgenic crops affect international trade.

Mycotoxins in corn are detrimental to animal and human health. Fumonisin, the most common corn mycotoxin, cause fatal diseases in some livestock species and are associated with serious human health problems in areas where corn is a large part of the diet. Mycotoxins occur in corn when the kernels are infected by certain fungi, especially *Aspergillus flavus* and several species of *Fusarium*. The hazards of mycotoxins have been recognized fairly recently, and many countries have responded by establishing standards or regulations that discourage or restrict the sale or use of corn containing mycotoxins. However, the standards set by different countries are quite variable and often revised. There is a need to harmonize international standards, but little agreement on what constitutes a safe level. The European Union currently has the world's most stringent standards for aflatoxins. Corn imported into Europe must contain no more than 4 parts per billion of aflatoxin. Countries that wish to export corn to Europe must meet this standard and therefore keep their most highly contaminated corn for domestic

use. Sadly, exporting countries such as China have populations that are much more at risk from aflatoxin poisoning than Europeans, due to the higher frequency of hepatitis infection in China. Now, the EU is planning to implement standards for other mycotoxins that are considerably more stringent than those used in the U.S. This could have a significant impact on international trade in corn grain, especially if the EU standards are adopted by other countries.

Against this backdrop, the most effective tool for reducing mycotoxin levels in corn—the use of Bt hybrids—continues to be rejected by most EU countries.

Since 1999, research has consistently shown that grain from Bt corn hybrids typically has lower levels of mycotoxins, especially fumonisins, compared to grain from conventional corn hybrids. Infection by mycotoxin-producing fungi is promoted by insect feeding, and some of these fungi are dependent on insect feeding for the majority of their infection. So, protecting the corn from insect feeding reduces the risk of mycotoxin accumulation. The best management strategy available for mycotoxins is to use corn hybrids that have transgenic insect protection combined with partial resistance to mycotoxin-producing fungi. Using this strategy greatly increases the chances that grain can meet stringent mycotoxin standards. Wu estimates that, currently, mycotoxin reductions through the use of Bt corn are saving U.S. growers about \$30 million each year, primarily by allowing access to markets with low mycotoxin

standards. But GMO regulations stand in the way of the potentially much larger benefit that could be experienced globally through the use of Bt corn.

There may be change on the horizon as regulatory agencies in different nations begin to consider not only adoption risks, but also risks of non-adoption and benefits, when devising new biotechnology regulations. In this case, there is a convincing argument for a more open policy toward Bt corn, where the benefits outweigh the risks. Especially human health risks which, while frequently hypothesized, have not been confirmed.

Munkvold, an internationally recognized expert in seed pathology, is an associate professor of Plant Pathology and a Seed Science Endowed Chair at Iowa State University.



Above: European corn borer injury (ECB) leading to infection from mycotoxin-producing fungi such as *Fusarium verticillioides* (left) and *Aspergillus flavus* (right). Bt hybrids are resistant to ECB and do not suffer this type of damage.